इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

IS 6476 (1987): Aluminium bulb plates for marine application - [CED 7: Structural Engineering and structural sections]

“ज्ञान से एक नये भारत का निर्माण”
Satyanarayan Gangaram Pitroda
“Invent a New India Using Knowledge”

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”
Bhartṛhari—Nītiśatakam
“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE

BRUTUM FULMEN
IGNORANTIA JURIS NON EXCUSAT
PROTECTED BY COPYRIGHT

IS : 6476 - 1987

(Reaffirmed 2004)

Indian Standard

SPECIFICATION FOR ALUMINIUM BULB PLATES FOR MARINE APPLICATION

(First Revision)

UDC 669·71-423-122 : 629·12

© *Copyright* 1988

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 3

April 1988

Indian Standard

SPECIFICATION FOR ALUMINIUM BULB PLATES FOR MARINE APPLICATION

(First Revision)

Structural Sections Sectional Committee, SMDC 6

Chairman

Shri M. Dhar
Flat No. 56, E-1, Kailash Apartments,
Lala Lajpat Rai Marg, New Delhi

Members	*Representing*
Shri V. K. Agrawal	Hindustan Aluminium Corporation Ltd, Renukoot
Shri N. G. Sharma (*Alternate*)	
Shri R. N. Aggarwal	Steel Authority of India Ltd (Bokaro Steel Plant), Bokaro
Shri B. K. Srivastava (*Alternate*)	
Shri S. Banerjee	Steel Re-Rolling Mills Association of India, Calcutta
Shri A. P. Bhatnagar	Steel Authority of India Ltd (Durgapur Steel Plant), Durgapur
Shri P. K. Debnath (*Alternate*)	
Shri N. Bhattacharya	Garden Reach Shipbuilder & Engineers Ltd, Calcutta
Shri S. C. Chadha	Directorate General of Supplies & Disposals (Inspection Wing), New Delhi
Shri B. B. Chakraverti	Superintendence Co of India (Pvt) Ltd, Calcutta
Shri A. K. Shome (*Alternate*)	
Shri D. S. Desai	M. N. Dastur & Co Pvt Ltd, Calcutta
Shri B. K. Dutta	Iron & Steel Control, Calcutta
Shri S. S. Saha (*Alternate*)	

(*Continued on page* 2)

© *Copyright* 1988
BUREAU OF INDIAN STANDARDS

This publication is protected under the *Indian Copyright Act* (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.

(*Continued from page* 1)

Members	*Representing*
SHRI S. K. GANGULY	Institution of Engineers (India), Calcutta
SHRI M. P. JASUJA	Steel Authority of India Ltd (Research & Development Centre for Iron & Steel), Ranchi
JOINT DIRECTOR STANDARDS (WAGON I), RDSO	Ministry of Railways
JOINT DIRECTOR STANDARDS (B & S) SB, RDSO (*Alternate*)	
SHRI A. J. JOSHI	Steel Authority of India Ltd (Bhilai Steel Plant), Bhilai
SHRI A. G. RAMA RAO (*Alternate*)	
LT-COL KULWANT SINGH	Engineer-in-Chief's Branch, Army Headquarters, New Delhi
MAJ S. B. PURI (*Alternate*)	
SHRI S. K. MITRA	Indian Iron & Steel Co Ltd, Burnpur
SHRI S. DUTTA (*Alternate*)	
SHRI P. K. MUKHERJEE	Braithwaite & Co Ltd, Calcutta
SHRI AMIT KUMAR BHATTACHARYA (*Alternate*)	
SHRI P. V. NAIK	Richardson & Cruddas Ltd, Bombay
SHRI KAMMAL PRAKASH	Metallurgical & Engineering Consultants (India) Ltd, Ranchi
SHRI C. S. KANNAN (*Alternate*)	
SHRI N. S. R. V. RAJU	Hindustan Shipyard Ltd, Visakhapatnam
SHRI D. KRISHNAMURTHY (*Alternate*)	
SHRI S. K. SADHU	Jessop & Co Ltd, Calcutta
SHRI S. C. CHAKRAVARTI (*Alternate*)	
SHRI M. C. SARANGDHAR	Stup & Co Ltd, Bombay
SHRI M. K. CHATTERJEE (*Alternate*)	
SHRI S. K. SARNA	Visakhapatnam Steel Project, Visakhapatnam
SHRI G. N. RAO (*Alternate*)	
SHRI K. R. SENGUPTA	Joint Plant Committee, Calcutta
SHRI B. P. GHOSH (*Alternate*)	
SHRI S. N. SINGH	EMC Steelal Ltd, Calcutta
SHRI C. K. NAG (*Alternate*)	
SHRI K. S. SRINIVASAN	National Buildings Organization, New Delhi
SHRI A. K. LAL (*Alternate*)	
SHRI K. SURYANARAYANAN	Indian Aluminium Co Ltd, Calcutta
SHRI G. M. MENON (*Alternate*)	
SHRI D. THIRUVENGADAM	Tube Products of India, Madras
SHRI K. V. VIJAYARAGHAVAN (*Alternate*)	
SHRI S. G. TUDEKAR	Steel Authority of India Ltd (Rourkela Steel Plant), Rourkela
SHRI J. N. BHAMBRY (*Alternate*)	
SHRI P. VISHWAKARMA	Tata Iron & Steel Co Ltd, Jamshedpur
SHRI A. HAQUE (*Alternate*)	
SHRI B. MUKHERJI, Director (Struc & Met)	Director General, BIS (*Ex-officio Member*)

Secretary

SHRI S. S. SETHI
Joint Director (Struc & Met), BIS

(*Continued on page* 9)

Indian Standard

SPECIFICATION FOR ALUMINIUM BULB PLATES FOR MARINE APPLICATION

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards on 22 July 1987, after the draft finalized by the Structural Sections Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 Aluminium, because of its lightness, strength and better resistance to atmospheric corrosion, is extensively used in marine application.

0.3 A large number of variety of aluminium sections are being produced in the country. In order to standardize these sections for their economic production, the Sectional Committee had formulated an Indian Standard series covering angles, channels, beams and tee sections for structural use and other applications, and bulb angles, bulb plates and tee bars for use in marine application. Other standards or aluminium sections for marine application are:

a) IS : 6449-1987 Specification for aluminium bulb angles for marine application (*first revision*), and

b) IS : 6475-1987 Specification for aluminium tee bars for marine application (*first revision*).

0.4 This Indian Standard was first formulated in 1971. In this revision, alloys with new designations as covered in IS : 733-1983* have been used.

0.5 In the preparation of this standard, the Sectional Committee kept in view the manufacturing and trade practices followed in the country in this field. Assistance has also been derived from ISO 1175-1986 'Shipbuilding — Dimensions and sectional properties of aluminium alloy sections for marine use', issued by the International Organization for Standardization.

---

*Specification for wrought aluminium and aluminium alloy bars, rods and sections (for general engineering purposes) (*third revision*).

0.6 A code of practice for use of aluminium alloys in structures, namely, IS : 8147–1976* was published which covered provisions for the design of structure (except bridges and pressure vessels) using aluminium alloys.

0.7 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers material, dimensions and sectional properties of aluminium bulb plates for marine applications.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 ***Y-Y* Axis** — A line parallel to the axis of the longer flange and passing through the centre of gravity of the profile of the section.

2.2 ***X-X* Axis** — A line passing through the centre of gravity of the profile of the section and at right angles to the *Y-Y* axis.

3. SYMBOLS

3.1 Letter symbols used in this standard have been indicated in the figures appearing along with Tables 1 and 2. The letter symbols used in Tables 1 and 2 shall have the meaning indicated against each as given below:

a = sectional area (without plate);

M = mass of the section per unit length (without plate);

O = centre of gravity;

e_x = distance of centre of gravity from the outerface of the bulb;

I_x = moment of inertia;

$Z_x = \frac{I_x}{e_x}$ = Section modulus;

t = plate thickness 5, 10 or 15 mm; and

L = width of plate = 40 t.

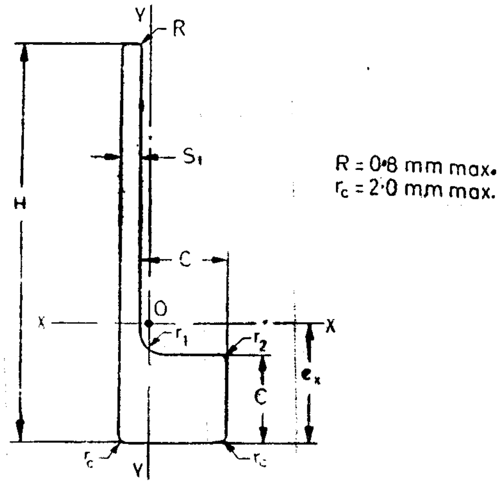
---

*Code of practice for use of aluminium alloys in structures.

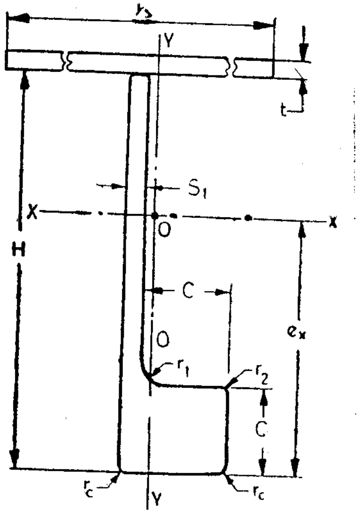
†Rules for rounding off numerical values (*revised*).

TABLE 1 BULB PLATES WITHOUT WELDING FLANGES

(*Clauses* 3.1, 5.1 *and* 5.3)



Without Plate



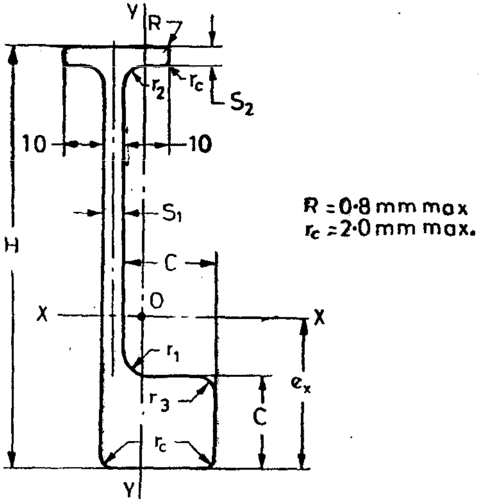
With Plate

DESIGNATION	DIMENSIONS					MASS* (WITHOUT PLATE)	SECTIONAL PROPERTIES											
							Section Without Plate			Section With Plate								
										$L \times t$: 200 × 5 mm			$L \times t$: 400 × 10 mm			$L \times t$: 600 × 15 mm		
(1)	H mm (2)	C mm (3)	S_1 mm (4)	r_1 mm (5)	r_2 mm (6)	M kg/m (7)	a cm^2 (8)	e_x cm (9)	I_x cm^4 (10)	e_x cm (11)	I_x cm^4 (12)	Z_x cm^3 (13)	e_x cm (14)	I_x cm^4 (15)	Z_x cm^3 (16)	e_x cm (17)	I_x cm^4 (18)	Z_x cm^3 (19)
AMB 50	50	12	3·5	4·5	3·0	0·85	3·21	1·67	6·79	4·38	38·2	8·74	5·21	53·9	10·3	5·61	75·4	13·4
AMB 60	60	14	3·5	4·5	3·0	1·08	4·08	1·91	12·2	4·99	67·0	13·4	6·07	93·5	15·4	6·54	120	18·4
AMB 70	70	16	3·5	4·5	3·0	1·33	5·03	2·14	20·0	5·54	108	19·4	6·90	152	22·0	7·45	187	25·1
AMB 80	80	18	4·0	5·5	3·0	1·71	6·47	2·44	33·2	5·97	166	27·8	7·66	241	31·5	8·33	290	34·8
AMB 90	90	20	4·5	6·0	3·0	2·14	8·09	2·76	53·1	6·35	242	38·1	8·37	362	43·3	9·17	433	47·2
AMB 100	100	22	4·5	6·0	4·0	2·48	9·36	2·98	74·6	6·73	330	49·1	9·07	507	55·9	10·0	604	60·2
AMB 110	110	24	5·0	7·0	4·0	3·00	11·3	3·30	110	7·03	446	63·4	9·69	706	72·9	10·8	844	78·1
AMB 120	120	26	5·0	7·5	4·0	3·4	12·8	3·51	146	7·34	575	78·4	10·3	934	90·5	11·6	1 120	96·7
AMB 130	130	28	5·5	8·5	4·0	4·00	15·1	3·83	203	7·58	737	97·1	10·8	1 230	113	12·3	1 490	121
AMB 140	140	30	6·0	9·0	4·0	4·64	17·5	4·15	275	7·82	924	118	11·4	1 580	139	13·0	1 940	149
AMB 150	150	32	6·0	9·0	4·5	5·13	19·4	4·30	344	8·07	1 130	140	11·9	1 970	166	13·7	2 430	177
AMB 160	160	34	6·5	10·0	4·5	5·86	22·1	4·68	450	8·28	1 730	166	12·2	2 440	198	14·4	3 050	212
AMB 170	170	36	7·0	10·5	4·5	6·63	25·0	5·00	578	8·50	1 650	194	12·7	2 990	235	15·0	3 780	252
AMB 180	180	38	7·5	11·5	4·5	7·46	28·2	5·32	733	8·71	1 970	226	13·1	3 610	276	15·6	4 620	297
AMB 200	200	42	8·0	12·0	4·5	8·98	33·9	5·85	1 080	9·13	2 680	294	13·8	5 020	365	16·7	6 570	394
AMB 220	220	46	9·0	13·5	4·5	10·9	41·3	6·49	1 610	9·57	3 610	377	14·4	6 820	474	17·6	9 110	516

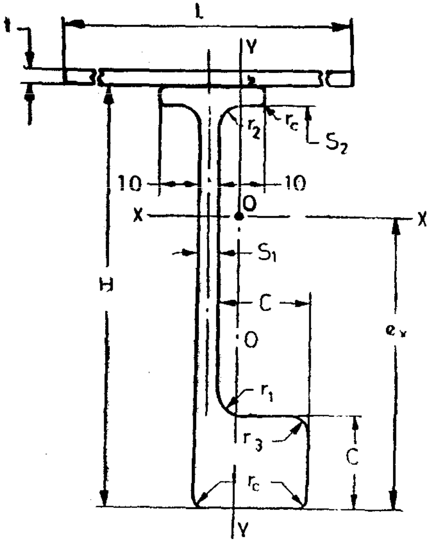
*Based on a density of 2·65 g/cm^3.

TABLE 2 BULB PLATES WITH WELDING FLANGES

(*Clauses* 3.1, 5.2 *and* 5.3)



Without Plate



With Plate

DESIGNATION	DIMENSIONS							MASS* (WITHOUT PLATE)	SECTIONAL PROPERTIES											
									Section Without Plate			Section with Plate								
												$L \times t$: 200 × 5 mm			$L \times t$: 400 × 10 mm			$L \times t$: 600 × 15 mm		
(1)	H mm (2)	C mm (3)	S_1 mm (4)	S_2 mm (5)	r_1 mm (6)	r_2 mm (7)	r_3 mm (8)	M kg/m (9)	a cm² (10)	e_x cm (11)	I_x cm⁴ (12)	e_{NA} cm (13)	I cm⁴ (14)	Z cm³ (15)	e_{NA} cm (16)	I cm⁴ (17)	Z cm³ (18)	e_{NA} cm (19)	I cm⁴ (20)	Z cm³ (21)
AMBW 50	50	12	3·5	4·0	4·5	3·5	3·0	1·07	4·03	2·39	13·1	4·40	38·4	8·72	5·21	54·0	10·4	5·00	76·0	13·6
AMBW 60	60	14	3·5	4·0	4·5	3·5	3·0	1·30	4·90	2·56	22·4	5·04	67·4	13·4	6·07	93·6	15·4	6·53	121	18·5
AMBW 70	70	16	3·5	4·0	4·5	3·5	3·0	1·55	5·85	2·79	35·1	5·60	109	19·4	6·90	152	22·0	7·45	187	25·1
AMBW 80	80	18	4·0	4·0	5·5	4·0	3·0	1·94	7·32	3·06	54·7	6·06	169	27·8	7·66	241	31·4	8·32	290	34·9
AMBW 90	90	20	4·5	4·5	6·0	4·5	3·0	2·40	9.06	3·40	84·2	6·47	247	38·2	8·37	362	43·2	9·17	433	47·2
AMBW 100	100	22	4·5	4·5	6·0	4·5	4·0	2·74	10·33	3·62	115	6·80	339	49·6	9·09	507	55·8	10·0	604	60·3
AMBW 110	110	24	5·0	5·0	7·0	5·0	4·0	3·29	12·4	3·95	165	7·21	460	63·8	9·71	707	72·8	10·8	844	78·1
AMBW 120	120	26	5·0	5·0	7·5	5·0	4·0	3·69	13·9	4·15	213	7·54	595	79·0	10·4	936	90·5	11·6	1 120	96·7
AMBW 130	130	28	5·5	5·5	8·5	5·5	4·0	4·32	16·3	4·49	391	7·82	767	98	10·9	1 230	113	12·3	1 490	121
AMBW 140	140	30	6·0	6·0	9·0	6·0	4·0	5·00	18·9	4·82	387	8·09	968	120	11·4	1 590	139	13·0	1 940	144
AMBW 150	150	32	6·0	6·0	9·0	6·0	4·5	5·48	20·7	5·02	476	8·35	1 180	141	11·9	1 980	166	13·8	2 430	177
AMBW 160	160	34	6·5	6·5	10·0	6·5	4·5	6·25	23·6	5·36	614	8·60	1 450	168	12·4	2 460	199	14·4	3 060	212
AMBW 170	170	36	7·0	7·0	10·5	7·0	4·5	7·06	26·6	5·69	780	8·85	1 750	198	12·8	3 010	236	15·0	3 780	252
AMBW 180	180	38	7·5	7·5	11·5	7·5	4·5	7·92	29·8	6·03	976	9·09	2 090	230	13·2	3 640	276	15·6	4 620	297
AMBW 200	200	42	8·0	8·0	12·0	8·0	4·5	9·47	35·7	6·56	1 410	9·55	2 880	301	13·9	5 080	365	16·7	6 580	394
AMBW 220	220	46	9·0	9·0	13·5	9·0	4·5	11·5	43·4	7·23	2 060	10·0	3 900	388	14·6	6 922	476	17·7	9 140	51

*Based on a density of 2·65 gm/cm³.

4. DESIGNATION

4.1 Aluminium bulb plate sections shall be designated as AMB or AMBW respectively for without and with welding flanges, followed by depth of the section in mm, for example, AMB 100 or AMBW 100.

5. DIMENSIONS AND SECTIONAL PROPERTIES

5.1 Dimensions and mass of Indian Standard aluminium bulb plates without welding flanges shall be as given in Table 1.

5.2 Dimensions and mass for Indian Standard bulb plates with welding flange shall be as given in Table 2.

5.3 For convenience of reference, relevant sectional properties are also given in Tables 1 and 2.

5.4 Dimensional tolerances for the sections shall be as specified in IS : 3965-1981*.

6. MATERIAL

6.1 Aluminium sections covered in this standard shall be manufactured from the alloys 53000, 54300, and 64430 in appropriate temper.

6.1.1 Aluminium alloys and temper selected shall conform to the provisions of IS : 733-1983†.

7. MARKING

7.1 Each lot/bundle of aluminium bulb plate sections shall be clearly marked with designation, alloy and temper, manufacturer's name and lot number/year of manufacture.

---

*Dimensions for wrought aluminium and aluminium alloys, bars, rods and sections (*first revision*).

†Specification for wrought aluminium and aluminium alloy, bars, rods and sections (for general engineering purposes) (*third revision*).

7.2 Bulb plate sections may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers, may be obtained from the Bureau of Indian Standards.

(*Continued from page* 2)

Panel for Structural Sections in Aluminium and Aluminium Alloys, SMDC 6 : P 3

Convener	*Representing*
Deputy Director Standards, Carriage I, RDSO	Ministry of Railways
Members	
Deputy Director Standards (B & S) SB (*Alternate* to Deputy Director Standards, Carriage I, RDSO)	
Shri V. D. Aggarwal	Bharat Aluminium Co, Calcutta
Shri V. K. Agrawal	Hindustan Aluminium Corporation Ltd, Calcutta
Shri N. G. Sharma (*Alternate*)	
Shri D. K. Barai	Cochin Shipyard Ltd, Cochin
Shri B. S. Brahmachari	Metallurgical & Engineering Consultants (India) Ltd, Ranchi
Shri A. V. Kelkar	Maharashtra State Road Transport Corporation, Pune
Shri B. Y. Deshpande (*Alternate*)	
Shri A. S. Lakra	Delhi Transport Corporation, Delhi
Shri M. Khaja Mohideen	Integral Coach Factory, Perambur
Shri K. B. Patel	Gujarat State Road Transport Corporation, Ahmadabad
Shri D. K. Nimavat (*Alternate*)	
Shri K. Purkayastha	Indian Aluminium Co Ltd, Calcutta
Shri V. Ramaswamy (*Alternate*)	
Shri K. R. Raghunath	Jindal Aluminium Ltd, Bangalore
Representative	Hindustan Shipyard Ltd, Visakhapatnam
Representative	Garden Reach Shipbuilder & Engineers Ltd, Calcutta
Shri K. K. Sud	Ministry of Defence (R & D)

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones : 3 31 01 31, 3 31 13 75 Telegrams : Manaksanstha (Common to all Offices)

Regional Offices:	*Telephone*
Central : Manak Bhavan, Bahadur Shah Zafar Marg, NEW DELHI 110002	33 10 131 33 11 375
*Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola, CALCUTTA 700054	36 24 99
Northern : SCO 445-446, Sector 35-C, CHANDIGARH 160036	2 18 43 3 16 41
Southern : C. I. T. Campus, MADRAS 600113	41 24 42 41 25 19 41 29 16
†Western : Manakalaya, E9 MIDC, Marol, Andheri (East), BOMBAY 400093	6 32 92 95
Branch Offices:	
'Pushpak', Nurmohamed Shaikh Marg, Khanpur, AHMADABAD 380001	2 63 48 2 63 49
'F' Block, Unity Bldg, Narasimharaja Square, BANGALORE 560002	22 48 05
Gangotri Complex, 5th Floor, Bhadbhada Road, T. T. Nagar, BHOPAL 462003	6 67 16
Plot No. 82/83, Lewis Road, BHUBANESHWAR 751002	5 36 27
53/5, Ward No. 29, R. G. Barua Road, 5th Byelane, GUWAHATI 781003	—
5-8-56C, L. N. Gupta Marg (Nampally Station Road), HYDERABAD 500001	23 10 83
R14 Yudhister Marg, C Scheme, JAIPUR 302005	6 34 71 6 98 32
117/418 B Sarvodaya Nagar, KANPUR 208005	21 68 76 21 82 92
Patliputra Industrial Estate, PATNA 800013	6 23 05
Hantex Bldg (2nd Floor), Rly Station Road, TRIVANDRUM 695001	7 66 37
Inspection Offices (With Sale Point):	
Pushpanjali, 205-A West High Court Road, Bharampeth Extension, NAGPUR 440010	2 51 71
Institution of Engineers (India) Building, 1332 Shivaji Nagar, PUNE 411005	5 24 35

---

*Sales Office in Calcutta is at 5 Chowringhee Approach P. O. Princep Street, Calcutta 700072 27 68 00

†Sales Office in Bombay is at Novelty Chambers, Grant Road, Bombay 400007 89 65 28

Printed at Kapoor Art Press, New Delhi, India